NVIS/NVG COCKPIT COMPATIBILITY CHECKLIST: FLIGHT

FLIGHT EVALUATION: DAY – NIGHT

Two flights should be accomplished:

a. Day orientation flight (for the evaluator) to reconnoiter the area and landing zones used during the night evaluation. This flight also serves to check in-flight daylight readability of modified instruments and gauges.

(1) Landing zones should not be confined or so small that the pilot is spending more time trying to position the helicopter than evaluating NVIS/NVG performance.

(2) Special attention must be given to location of obstacles (wires, fences, etc.) that might not be visible at night on NVGs.

(3) CAUTION: Past experience shows that in some cases finding the same LZ is difficult at night and could result in attempting to land in area that was not reconnoitered.

TECHNIQUE: Use a GPS to mark LZ and note the inbound heading and hazard locations (especially wires) relative to inbound flight path.

(4) Evaluate day readability of filtered instruments, particularly CAWS panels, radios, and primary gauges and instruments.

b. Night evaluation flight.

(1) Should be conducted on moonless night, VMC in order to work the NVG in relation to glare and reflections.

(2) Should be conducted in area that allows for both high cultural lighting and minimal to no cultural lighting to assess ability of NVIS lighting-NVG to support pilot operations.

(3) Will consist of high/low recon of LZ, approach to hover, landing in the LZ, takeoff from LZ.

(4) Landings and takeoffs will be performed with and without landing lights and searchlights.

Note: Day evaluation should include the use of polarized sunglasses or corrective lens to determine if the NVIS compatible instruments use polarized filters. The polarized shades or corrective lens should be evaluated for each 90 degrees of rotation to ensure visibility. A flight manual limitation stating the incompatibility of the instruments with polarized shades or corrective lens will be necessary if the instruments cannot be viewed at all angles.

PRE-FLIGHT ACTIVITIES

#	Item	Comment/Remark
1	Statement of Conformity – CHECK Ensure the aircraft equipment to be evaluated is conformed and is annotated in the appropriate forms.	
2	Aircraft Status – EXPERIMENTAL Ensure the aircraft is in "experimental" status for the flight tests.	
3	Safety Pilot A safety pilot who is current on NVG use must be available to fly with the test pilot. The safety pilot must be familiar with NVG flight and the hazards inherent in NVG use. NOTE: If determined from the ground test that the normal configuration of the aircraft is required for the flight evaluation, it may not be possible to install dual controls. In this case, appropriate training/authorization may be required for the FAA/AUTHORITY engineering test pilot to conduct the in-flight evaluation. In addition, special test equipment may be installed during the evaluation to enhance flight test safety. If additional personnel are required for the evaluation, the appropriate crew stations will be installed.	
4	Flight Briefing – ACCOMPLISH 1. Crew/Duties 2. Aircraft configuration 3. Planned T.O./Duration/Land 4. Flight Route 5. Flight test points 6. Abnormal Procedures 7. Emergency Procedures	

#	**Item**	**Comment/Remark**
5	NVIS/NVG Preflight 1. Power/battery source (ensure spare batteries) - CHECK 2. Lenses/objectives-CLEAN (if required) 3. Helmet mounts - SECURE 4. If test device or light lane available, check NVG focus in accordance with operating instructions. 5. Clean aircraft Windscreens 6. Instrument lights set for operational NVG levels.	
6	NVG Adjustment: At aircraft, adjust NVG's for flight operations in accordance with operating/manufacturers instructions.	
7	Exterior Lighting – ●If position/anti-collision/landing lights were modified with baffles or shields to prevent NVG interference, check security of the shields and light visibility. ●If NVIS compatible lenses were installed, check to see that light color is preserved (Red, Green, White) ●Check function of searchlight. ●Check external equipment (white wire cutters, floats, etc.) that may cause reflections from external lights into the cockpit	
8	Start the engine with the battery to be sure engine gauges remain illuminated (LED's may require a higher voltage to remain illuminated.) With the engine(s) running, operate aircraft equipment to check for radiated or conducted electrical interference with the alternate lighting system. Note system states or modes of operation that should be evaluated during flight. After worst case is defined, the interference shall be eliminated at the source or the interference shall be evaluated to assure that the NVG or NVIS lighting system functions do not result in an unsafe condition.	

FLIGHT TEST/EVALUATION

#	ITEM	Comments
	CAUTION: Do not continue evaluation if unable to see outside the aircraft while wearing NVGs due to reflections, glare, or other internal or external interference. Discontinue evaluation activity, climb to a safe altitude and regroup. If interference continues on subsequent attempt, return to land and investigate the interference source using the ground test site.	
1	T.O./Climbout a. Ability to clear around and forward of flight path b. Searchlight, external lighting interference c. Radar altimeter readability, compatibility of altitude alerting system. d. Reflections/glare	

#	ITEM	Comments
2	Cruise: a. Reflections (Front and side) (1) Reflections seen in the ground eval that were not corrected must be evaluated in flight. (2) The pilot must be able to see desired target without distraction from the reflection. (Note: Some reflections seen on the ground are not distracting in flight. Alternately, some of the reflections prevent the pilot from seeing outside the aircraft.) (3) Operate all external lights (position, anti-collision, landing, and searchlight) to find any reflections coming into the cockpit. (A) Note: The most common reflections are from anti-collision and landing lights reflecting off of aircraft structure into the cockpit through the chin bubble. A technique to evaluate is to activate each set of lights individually to see which set causes the problem. (B) Solutions that have worked in the past are: • Painting the reflective surface flat black (i.e., painting a lower wire cutter flat black stopped light reflecting into the cockpit.) • Use of floor mats that partially cover the chin bubble to block reflected light. Pilots must still see out of the chin windows as required. • Light baffles or shrouds on fixed lights to deflect the light away from the cockpit. b. Glare: Activate all cockpit lights to evaluate presence of glare from previously identified sources. Evaluate the effect of the hot spot on the pilot's ability to see outside the aircraft and interfere with instrument cross checks in flight. c. Instrument readability: (1) Gauge legibility during normal cross-check. Legibility must be as good or better than legibility using standard instrument lighting set at operational levels. Color bands are discriminable. (2) "Flicker" on gauge due to vibration. NVIS lights should not vibrate and cause "flickering" that makes reading the instrument/gauge difficult.	

#	ITEM	Comments
3	IF WINDSCREEN ANTI-ICE INSTALLED Windscreen Anti-Ice (If installed) - ON **CAUTION: When testing the anti-ice system, be sure to review operating limitations for the system. Damage to the windshield can occur if the system is operated inappropriately.** View a target through aircraft windscreen. Determine if there is degradation of NVG acuity/performance as a result of the windscreen anti-ice system.	
4	Landing Zone Reconnaissance: a. Reflections: b. Searchlight control and effectiveness c. Glare.	

#	ITEM	Comments
5	Landing Zone Approach and Land: a. RADALT/VSI/Airspeed readability b. Reflections: Test Technique for evaluating the reflections listed below: (1) If a reflection is noticed on approach to land or the landing phase, isolate the light causing the reflection. (2) Pick up to a hover to an altitude where reflections occur. (3) Start turning off external lights and note reflection change. (4) Activate the set of lights suspected of causing the reflection to confirm, then land to see if same reflection occurs. (5) This is iterative and may require multiple tests to isolate. (6) The reflections may also be caused by multiple light sources. (i) Searchlight-ground-aircraft reflections (ii) Landing light-ground reflections (iii) Anti-collision/position light-ground reflections c. Ability to see far objects with landing light and/or searchlight on: (1) Select an object at the edge of the landing zone visible with the landing light/searchlight off. (2) Activate the landing light and searchlight separately and see if the object is still visible (not washed out by light reflected back to cockpit from closer objects/ground	
6	EMI/HIRF: Operate aircraft equipment to check for radiated or conducted electrical interference with the alternate lighting system. Note system states or modes of operation that should be evaluated during flight. After worst-case is defined, the interference shall be eliminated at the source or the interference shall be evaluated to assure that the NVG or NVIS lighting system functions do not result in an unsafe condition.	

#	ITEM	Comments
7	Check pilot's/observer's ability to move in cockpit, view and operate switches/controls with NVG's in viewing and stowed position. Use representative pilot samples (height: 5'2" to 6'0"). a. Record Pilot/Observer ability to see/access overhead panel switches/controls. b. Record Pilot/Observer ability to see/access side/center panel switches/controls. c. Record any interference with aircraft ceiling, structures, controls.	

Note: If the cabin lights have been modified or partially modified for NVG compatibility, the use of these lights should be included in the flight evaluation to ensure no objectionable glare or NVG degradation.